

# LineAmp

*-a heterodyne technique to determine calibration line strength and phase.*

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# Heterodyne methods

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- unfiltered AS\_Q channel mixed with local (software) oscillator with the line frequency
  - » Shifts the line frequency to zero
- real and imaginary parts form two quadratures
  - » deduce the amplitude and phase.
  - » two quadratures are normally distributed
- result integrated over a given time period (60s)

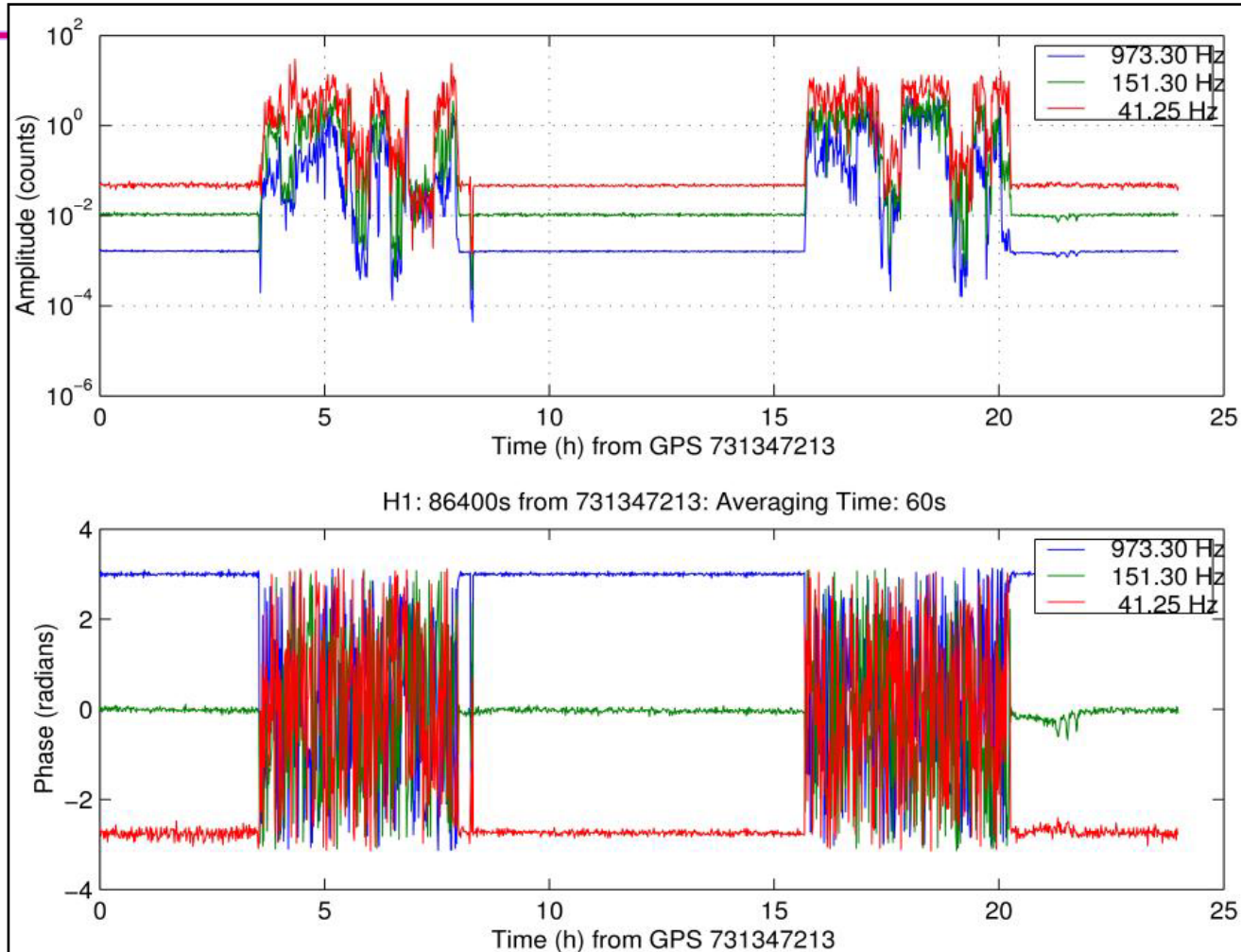
# LineAmp packages

- coded in MATLAB
- produces trend files in .mat format.
- MATLAB scripts produce eps figures of amplitude and phase
- scripts automate daily summary figure production

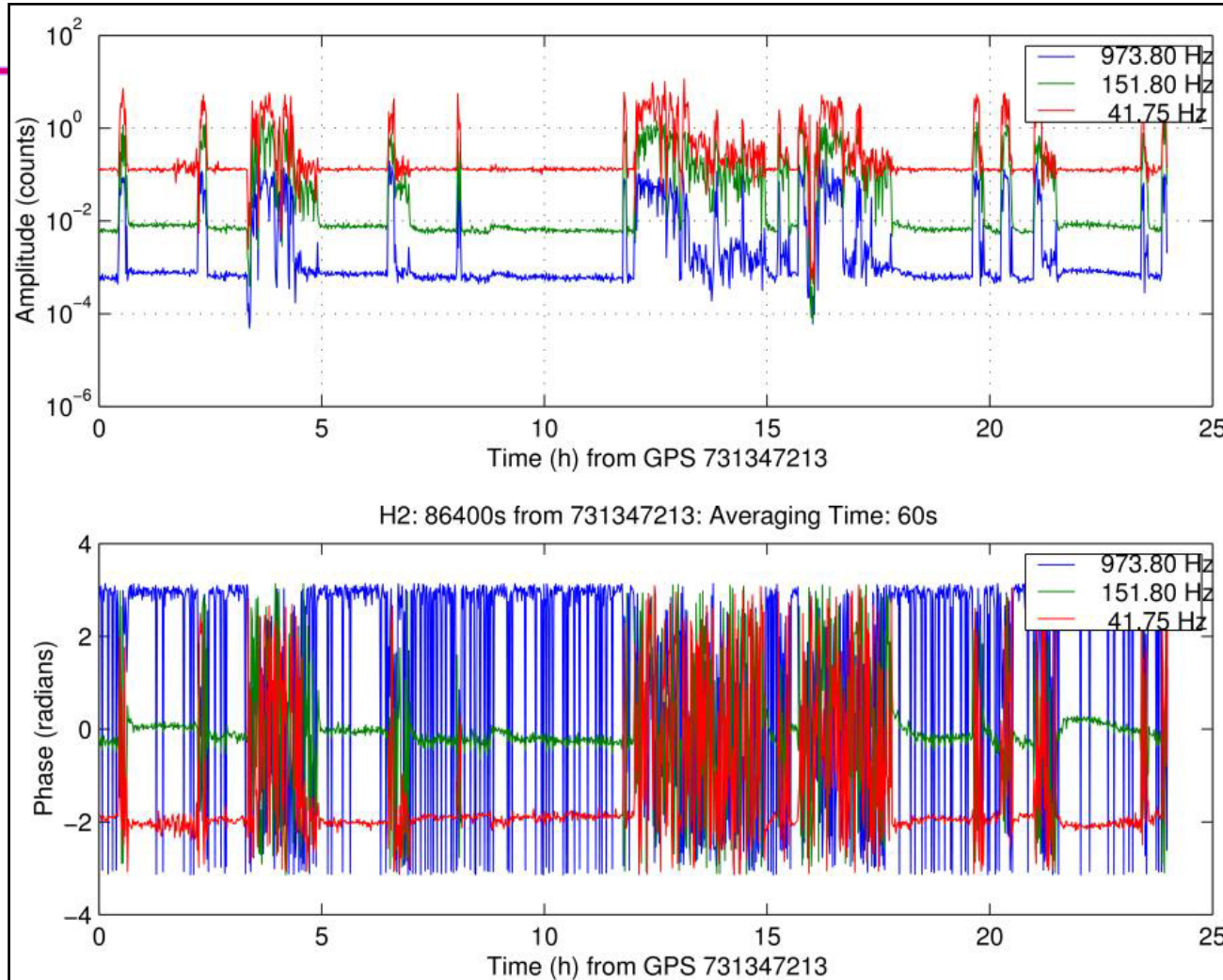
S2 summary and data files

<https://gravity.psu.edu/~s2/detchar/lineamp>

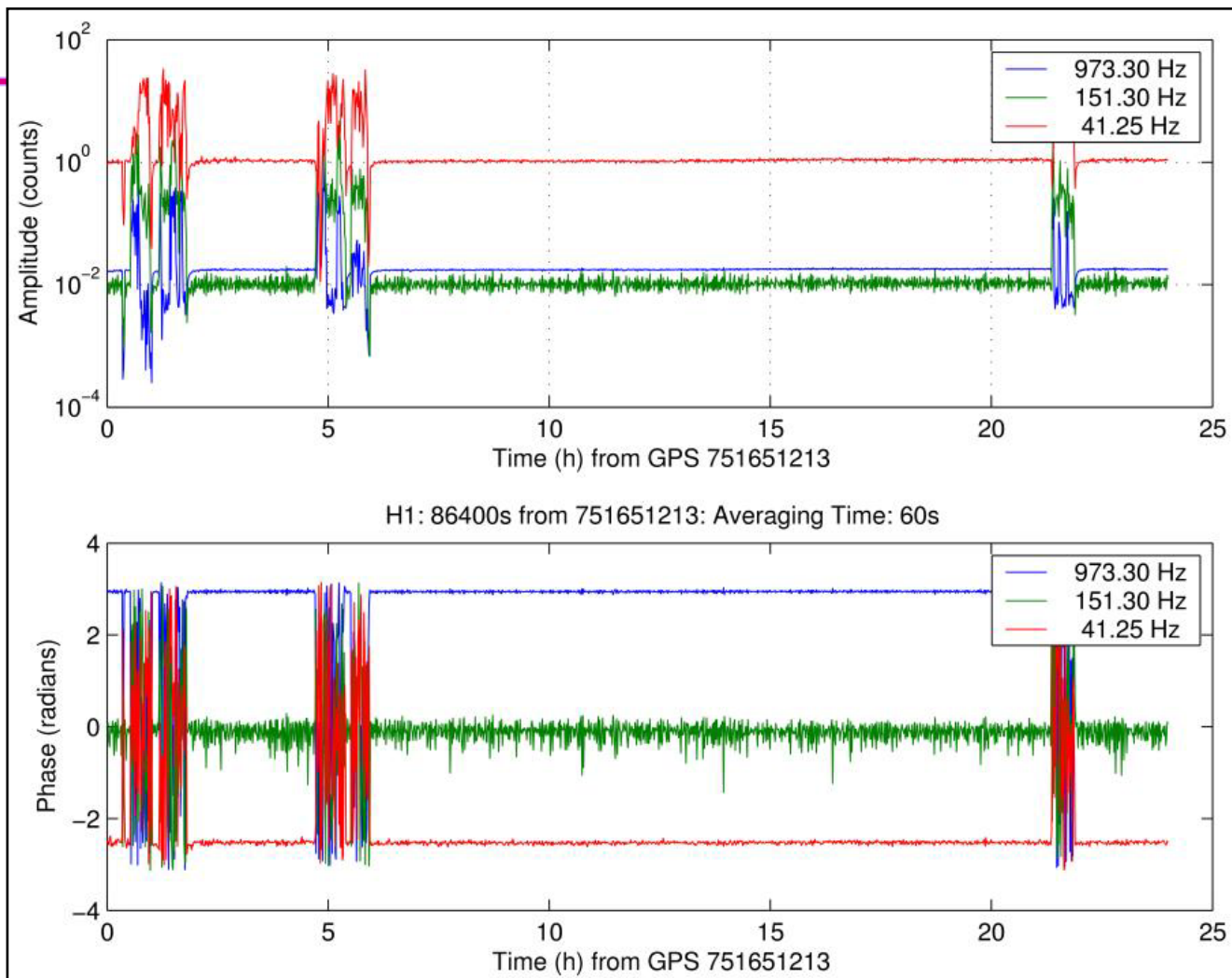
# S2 data



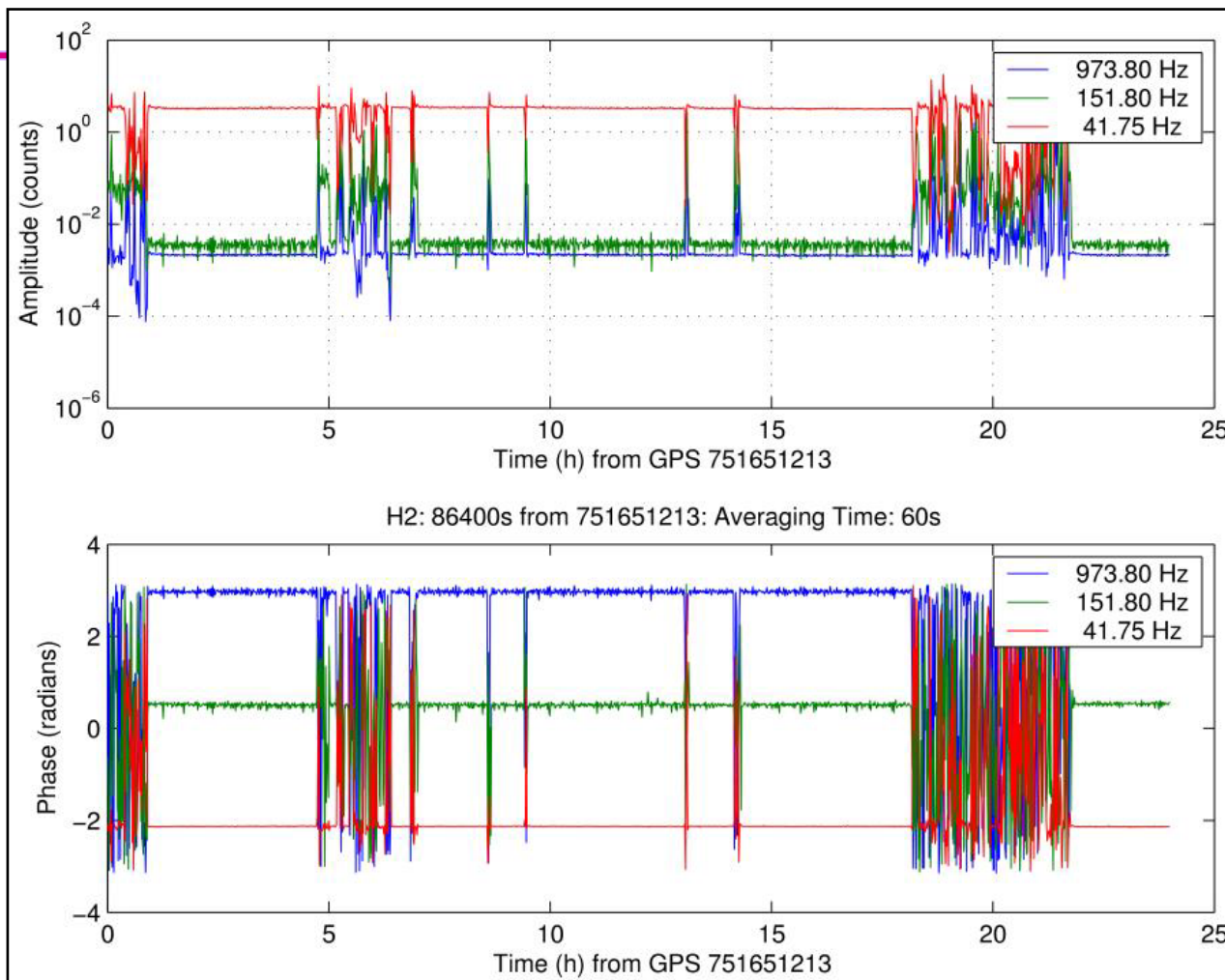
# S2 data



# First look at S3



# First look at S3



# Compiled versions

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- produced using the MATLAB compiler
- yields an executable which only requires:
  - » the MATLAB runtime libraries installed (free and MATLAB not required!)
  - » access to frames by
    - LDAS (for FrameCacheQuery) *or*
    - LDR and PSU's FrameIO::Channel routines
- analyses 1 day in approximately 1 hour.
  - Comparison: interactive use requires just under 2 hours per job.



# Status and Future Directions

- Transfer function stability of the IFO
  - » compares AS\_Q and an excitation channel
  - » calculates the relative amplitude and phase
  - » presently validating results
- Investigation of detector stationarity
  - » Rician distributed amplitude (phase obeys related function)
  - » use amplitude ( $\mu$ ,  $\sigma$ ) to determine if transfer function consistent
  - » divide data into stationary segments

*Is there some 'natural' period of time to produce lineamp averages?*

# Status and Future Directions

- produce a fast tool for producing alpha and beta coefficients for offline verification.
- Minute trend (almost real time) for analysing data online.
- Online plots for H1,H2 being generated.
- L1 coming soon.

[LineAmp Webpage -  
http://gravity.psu.edu/~ashley/LSC/LineAmp](http://gravity.psu.edu/~ashley/LSC/LineAmp)